

MATERIAL SAFETY DATA SHEET

National Institute of Standards and Technology
Standard Reference Materials Program
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SRM Number: 3000
MSDS Number: 3000
SRM Name: Benzene in Methanol

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SECTION I. MATERIAL IDENTIFICATION

Material Name: Benzene in Methanol

Description: SRM 3000 consists of two 5-milliliter sealed borosilicate glass ampoules containing approximately 2.5 mL of a solution of benzene in methanol.

Other Designations: **Benzene** (benzol; cyclohexatriene; benzole; phene; pyrobenzol; pyrobenzole; coal tar naphtha; phenyl hydride; benzolene) in **Methanol** (methyl alcohol; wood alcohol; methyl hydroxide; carbinol; monohydroxymethane; wood spirit; wood naphtha; methylol)

Name	Chemical Formula	CAS Registry Number
Methanol	CH ₃ OH	67-56-1
Benzene	C ₆ H ₆	71-43-2

DOT Classification: Methanol; UN1230; Packing Group II; Hazard Class 3.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Methanol	99	OSHA TWA: 260 mg/m ³ (200 ppm)
		NIOSH recommended TWA (skin): 260 mg/m ³ (200 ppm) (10 h)
		NIOSH recommended STEL (skin): 325 mg/m ³ (250 ppm)
		OES, UK TWA (skin): 266 mg/m ³ (200 ppm)
		OES, UK STEL (skin): 333 mg/m ³ (250 ppm)
		Human, Inhalation: TC _{LO} : 86 000 mg/m ³
		Human, Oral: LD _{LO} : 143 mg/kg
Benzene	1	Man, Oral: TD _{LO} : 3 429 mg/kg
		ACGIH TWA (skin): 0.5 ppm
		OSHA TWA: 1 ppm
		NIOSH recommended TWA: 0.1 ppm (10 h)
		NIOSH recommended STEL: 1 ppm
		Rat, Oral: LD ₅₀ : 930 mg/kg
		Man, Oral: LD _{LO} : 50 mg/kg

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Methanol	Benzene
Appearance and Odor: a clear, colorless liquid with a characteristic alcoholic odor	Appearance and Odor: colorless to yellow liquid with a distinct odor
Relative Molecular Mass: 32.04	Relative Molecular Mass: 78.11
Density: 0.7914 g/m ³	Density (@ 20 °C): 0.8765 g/m ³
Boiling Point: 65 °C (149 °F)	Boiling Point: 80 °C (176 °F)
Freezing Point: -94 °C (-137 °F)	Freezing Point: 6 °C (43 °F)
Vapor Pressure (@ 20 °C): 97.25 mmHg	Vapor Pressure (@ 20 °C): 75 mmHg
Evaporation Rate (butyl acetate = 1): 4.6	Evaporation Rate (butyl acetate = 1): 5.1
Viscosity (@ 20 °C): 0.59 cP	Viscosity (@ 20 °C): 0.6468 cP
Water Solubility: soluble	Water Solubility (@ 25 °C): 0.18 %
Solvent Solubility: soluble in ether, benzene, alcohol, acetone, chloroform, ethanol, ketones, and most other organic solvents	Solvent Solubility: soluble in acetone, alcohol, carbon disulfide, ether, carbon tetrachloride, chloroform, acetic acid, oils, and organic solvents

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this methanol/benzene solution do not exist. The actual behavior of the solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Methanol**Flash Point:** 11 °C**Method Used:** Closed Cup**Autoignition Temperature:** 385 °C**Flammability Limits in Air (Volume %):** **UPPER:** 36
LOWER: 6.0**Benzene****Flash Point:** -11 °C**Method Used:** Closed Cup**Autoignition Temperature:** 498 °C**Flammability Limits in Air (Volume %):** **UPPER:** 7.8
LOWER: 1.2

Unusual Fire and Explosion Hazards: Methanol is a severe fire and explosion hazard when exposed to heat or flame. Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Vapor and air mixtures are explosive.

Benzene is a severe fire hazard. Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Vapor and air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

Extinguishing Media: Use alcohol-resistant foam, dry chemical, carbon dioxide, or water spray.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: X **Stable** **Unstable**

Conditions to Avoid: Avoid contact with heat, sparks, flames, or other sources of ignition. Avoid inhalation of vapors or combustion by-products. Avoid contact with the skin. Do not allow the material to contaminate water sources.

Incompatibility (Materials to Avoid): This material is incompatible with halocarbons, combustible materials, metals, oxidizing materials, halogens, metal carbide, bases, and acids.

See Section IV: "Unusual Fire and Explosion Hazards".

Hazardous Decomposition or Byproducts: Thermal decomposition products may include toxic oxides of carbon and various organic fragments.

Hazardous Polymerization: **Will Occur** X **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: X **Inhalation** X **Skin** X **Ingestion**

Methanol: Methanol is a skin and eye irritant and can cause nerve damage. This material is harmful if inhaled or absorbed through skin. Ingestion may be fatal or cause blindness. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure can cause damage to the eyes, liver, heart, and kidneys. Methanol may also cause gastrointestinal disturbances and convulsions.

Benzene: Benzene may be harmful if swallowed, inhaled, or absorbed through skin. Vapor or mist is irritating to the skin, eyes, mucous membranes, and upper respiratory tract. Exposure can cause nausea, dizziness, headache, and narcotic effects. Benzene is a carcinogen. It may alter genetic material and/or cause blood effects.

Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation and/or giddiness, depression, drowsiness, or fatigue. The victim may experience nausea, vomiting, headache, dizziness, tightness in the chest, breathlessness, and loss of consciousness. Blurred vision shallow, rapid breathing, delirium cardiac arrhythmias, unconsciousness, deep anesthesia, paralysis, and coma can occur in a few minutes to several hours following severe exposures. In fatal exposures, death may be due to asphyxia, central nervous system depression, cardiac or respiratory failure and circulatory collapse, or occasionally, sudden ventricular fibrillation. Aspiration of small amounts of liquid into the lungs may be fatal. Symptoms may include coughing, difficulty breathing, cyanosis, and pulmonary edema. Contact with the liquid in the mouth, throat, and stomach may cause irritation, burning sensation, and lesions of the mucous membranes. Direct skin contact may cause irritation. Repeated or prolonged skin contact may result in blistering, edema, drying, scaling dermatitis, or development of secondary skin infections. Eye contact may cause irritation. Prolonged eye contact may cause conjunctivitis.

Target Organs of Attack: Central nervous system and immune system (blood).

Medical Conditions Generally Aggravated by Exposure: **Methanol** may cause eye disorders, kidney disorders, skin disorders, and allergies; **benzene** may cause blood system disorders, immune system disorders, or allergies.

Listed as a Carcinogen/Potential Carcinogen (Methanol):

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u>X</u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u>X</u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u>X</u>

Listed as a Carcinogen/Potential Carcinogen (Benzene):

	Yes*	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u>X</u>	<u> </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u>X</u>	<u> </u>
By the Occupational Safety and Health Administration (OSHA)	<u>X</u>	<u> </u>

*NTP classifies benzene as a *Known Human Carcinogen*; IARC classifies benzene as *Human Sufficient Evidence*; *Animal Sufficient Evidence*.

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration by qualified personnel. Obtain medical assistance if necessary.

Ingestion: If ingested, wash out mouth with water. Obtain medical assistance immediately.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major spills and/or leaks. Evacuate nonessential personnel. Avoid heat, flames, sparks, and other sources of ignition. Stop the leak if one can do so without risk. Absorb small spills with sand or other non-combustible absorbent material and place into containers for proper disposal.

Waste Disposal: Follow all federal, state, and local laws governing disposal. Methanol is subject to disposal regulations U.S. EPA 40 CFR 262, Hazardous Waste Number U154. Benzene is subject to disposal regulations U.S. EPA 40 CFR 262, Hazardous Waste Numbers, U019 and D018. Dispose of benzene in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the regulatory level of 0.5 mg/L.

Handling and Storage: Persons handling this material must wear protective eyewear, clothing, and gloves to prevent contact with this material.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

This material should be stored in a cool, dry, well-ventilated area away from incompatible materials and conditions. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Benzene*, 16 September 2004.
MDL Information Systems, Inc., MSDS *Methyl Alcohol*, 16 September 2004.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified value for this material is given in the NIST Certificate of Analysis.